Beaver-Camas Subbasin Assessment and Total Maximum Daily Loads

Department of Environmental Quality

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Cover photo provided by Idaho Department of Environmental Quality.

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Abbreviations, Acronyms, and Symbols

§303(d)	Refers to section 303 subsection (d) of the Clean Water Act, or a list of impaired water bodies required by this section
µ	micro, one-one thousandth
§	Section (usually a section of federal or state rules or statutes)
ADB	assessment database
AU	assessment unit
AWS	agricultural water supply
BLM	United States Bureau of Land Management
BMP	best management practice
BOR	United States Bureau of Reclamation
BURP	Beneficial Use Reconnaissance Program
C	Celsius
CFR	Code of Federal Regulations (refers to citations in the federal administrative rules)
cfs	cubic feet per second
cm	centimeters
CWA	Clean Water Act
CWAL	cold water aquatic life
CWE	cumulative watershed effects
DEQ	Department of Environmental Quality
DO	dissolved oxygen
DOI	U.S. Department of the Interior
DWS	domestic water supply
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
F	Fahrenheit
FWS	U.S. Fish and Wildlife Service
GIS	Geographical Information Systems
HUC	Hydrologic Unit Code
I.C.	Idaho Code
IDAPA	Refers to citations of Idaho administrative rules
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
km	kilometer
km^2	square kilometer
LA	load allocation
LC	load capacity
m	meter

m^3	cubic meter
mi	mile
mi^2	square miles
MGD	million gallons per day
mg/L	milligrams per liter
mm	millimeter
MOS	margin of safety
NA	not assessed
NB	natural background
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTU	nephelometric turbidity unit
PCR	primary contact recreation
PFC	proper functioning condition
ppm	part(s) per million
QA	quality assurance
QC	quality control
SBA	subbasin assessment
SCR	secondary contact recreation
SS	salmonid spawning
STATSGO	State Soil Geographic Database
TKN	total Kjeldahl nitrogen
TMDL	total maximum daily load
TP	total phosphorus
TS	total solids
TSS	total suspended solids
t/y	tons per year
U.S.	United States
U.S.C.	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFS	United States Forest Service
USGS	United States Geological Survey
WAG	Watershed Advisory Group
WBAG	*Water Body Assessment Guidance*
WBID	water body identification number
WLA	wasteload allocation
WQLS	water quality limited segment
WQMP	water quality management plan
WQS	water quality standard

Executive Summary

The federal Clean Water Act (CWA) requires that states and tribes restore and maintain the chemical, physical, and *biological integrity* of the nation's waters. States and tribes, pursuant to Section 303 of the CWA, are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are *water quality limited* (i.e., water bodies that do not meet water quality standards). States and tribes must periodically publish a priority list (a "§303(d) list") of impaired waters. Currently this list must be published every two years. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants, set at a level to achieve water quality standards.

This document addresses the water bodies in the Beaver-Camas Subbasin that have been placed on Idaho's current §303(d) list.

This *subbasin assessment* (SBA) and TMDL analysis have been developed to comply with Idaho's TMDL schedule. The assessment describes the physical, biological, and cultural setting; water quality status; pollutant sources; and recent pollution control actions in the Beaver-Camas Subbasin, located in southeastern Idaho.

The first part of this document, the SBA, is an important first step in leading to the TMDL. The starting point for this assessment was Idaho's current §303(d) list of water quality limited water bodies. Six segments of the Beaver-Camas Subbasin were listed on this list. The SBA examines the current status of §303(d) listed waters and defines the extent of impairment and causes of water quality limitation throughout the subbasin. The TMDL analysis quantifies pollutant sources and allocates responsibility for load reductions needed to return listed waters to a condition of meeting water quality standards.

Subbasin at a Glance

The Beaver-Camas Subbasin of southeastern Idaho (Figure A) is a watershed of the Upper Snake River Basin. This watershed is the easternmost in a series of five sinks drainages in the Upper Snake River Basin. The hydrology of the subbasin is dominated by both natural and human caused flow alterations, which contribute to limited beneficial use attainment in several 303(d) listed *reaches* in the watershed.

Data has been collected and analyzed to evaluate the scope of the water quality limiting issues on the 303(d) listed and non-listed streams in the Beaver-Camas Subbasin Creek Subbasin. Seven temperature TMDLs and one sediment TMDL, as summarized in Table A, have been developed from the results of the data, or in response to the data.

Table A. Streams and pollutants for which TMDLs were developed.

Stream	Pollutant(s)
Beaver Creek	Temperature
Camas Creek	Sediment, Temperature
Dairy Creek	Temperature
East Camas Creek	Temperature
Modoc Creek	Temperature
Threemile Creek	Temperature
West Camas Creek	Temperature

TMDLs for sediment are quantified through streambank erosion inventories. Sediment loading targets were developed based on literature detailing expected natural conditions and substrate sediment impacts on salmonid spawning. The target values established will be used to quantify streambank recovery and determine the need for additional management practices to improve water quality.

TMDL targets for substrate sediment are adopted from literature detailing its impact on salmonid egg and fry emergence. The target values established in this assessment will be used to indicate trends related to channel morphology and streambank recovery. Beneficial use support status and compliance with state water quality standards will be used to determine the need for additional best management practices to improve water quality.

Temperature TMDLs have been developed for all streams, where thermograph data has been collected, to support salmonid spawning and cold water aquatic life. Cold water aquatic life and salmonid spawning have been determined to be the presumed uses for all streams in the subbasin.

Reduced riparian vegetation contributes to accelerated streambank erosion, which results in increased thermal loading, which, combined with associated changes in channel morphology are the primary causes of increased temperature loading in affected streams.
Elevated temperatures from reduced riparian vegetation and accelerated streambank erosion have been exacerbated by an ongoing drought in the subbasin.

TDMLs were not developed for streams listed as flow altered. Streams listed as flow altered and streams discovered to be flow altered for significant portions of the year do not have a reasonable potential to support beneficial uses. The EPA does not believe that flow (or lack of flow) is a pollutant as defined by CWA Section 502(6). Since TMDLs are not required to be established for waterbodies impaired by pollution but not pollutants, TMDLs will not be developed for flow altered streams, at this time. They will be relisted as flow altered in subsequent integrated reporting events.

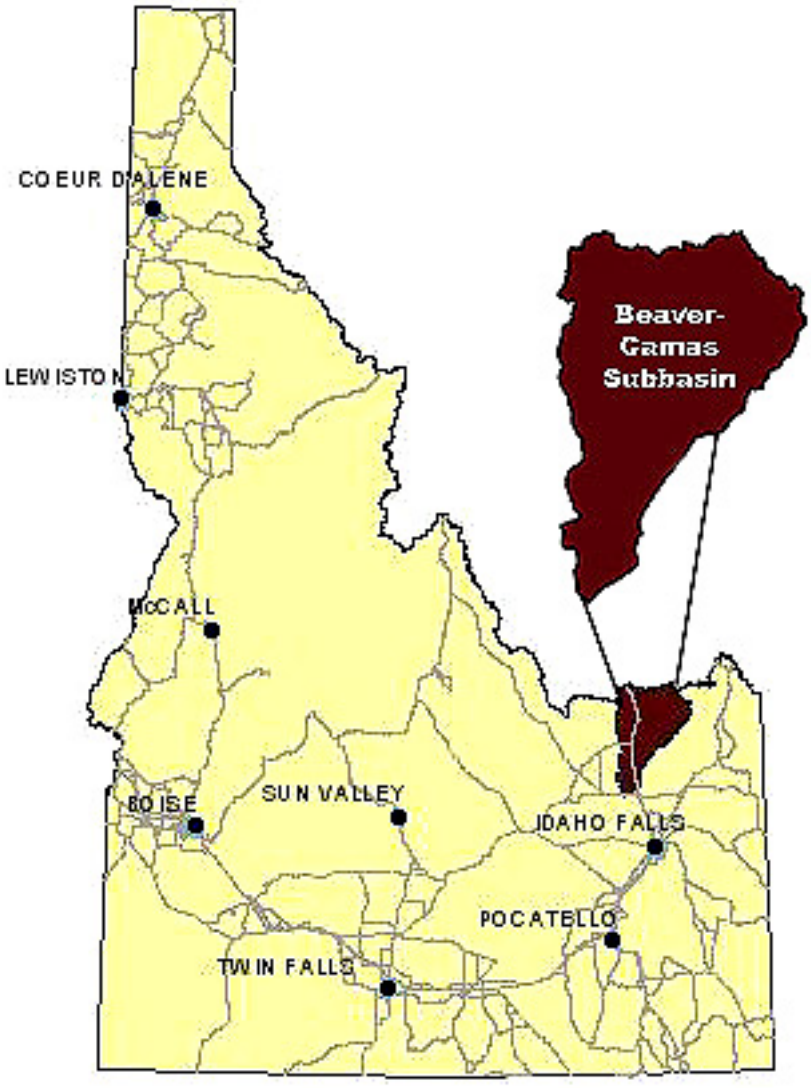

Figure A. Beaver-Camas Subbasin at a Glance

Key Findings

The hydrology of the Beaver-Camas subbasin is relatively complex, with a combination of gaining reaches in the upper elevations and losing reaches in the lower elevations. Hydrograph data show that a peak in flow is experienced in the early spring, when spring *runoff* peaks and surface water is able to reach the lower sections of the subbasin. Natural runoff flows are seen in the lower section of the subbasin for a short period of time during the peak runoff event. Natural infiltration into the basalt streambed is the causative agent for the absence of lower watershed flows. This is the natural hydrologic behavior of surface waters in the subbasin.

Land use in the subbasin is essentially split into two sections; the upper half of the subbasin is used for rangeland, and the lower section of the subbasin is utilized for crop production. The demand for surface water in the lower half of the subbasin is very high, therefore a

complex system of irrigation canals have been developed for the transport of water. Since surface water is naturally infiltrating out of the stream, groundwater must be returned to Camas Creek to provide the necessary water for irrigation.

Since the lower sections of Beaver and Camas Creeks (303(d) listed) are naturally dry and have been converted into canal systems, TMDLs will not be developed for these listed sections.

Hydrology in the upper half of the subbasin is, for the most part, different than that of the lower half. Perennial flows are sustained in the majority of the streams and land management is focused towards rangeland grazing.

Riparian grazing is the principal source of temperature and sediment loading to the watershed. Riparian destruction leads to overall changes in channel morphology, sedimentation, and reduced stream shading, which leads to increased solar loading to the stream.

TMDLS are recommended for sediment and temperature impaired streams based upon the following criteria:

Temperature TMDLs have been developed for streams where temperature data has been collected and shows an exceedance of temperature criteria in greater than 10% of observation days during spring or fall spawning periods. Thermograph data established that temperature TMDLs were necessary to meet the numeric salmonid spawning criteria [IDAPA 58.01.02.250(02)]. All Temperature TMDL load reductions were developed by quantifying the solar radiation through solar pathfinder data, which measures the percent solar time. Percent solar time was converted into a solar load by multiplying the percent of solar time (April through September) by an average solar load in $kWh/m^2/day$. Streambank erosion, reduced riparian vegetation, and low flow conditions are the causes of increased water temperatures in the subbasin. The TMDL temperature targets are the salmonid spawning temperature criteria established in Idaho's administrative code [IDAPA 58.01.02.250(02)].

There are five 303(d) listed stream segments in the Beaver-Camas Subbasin and seven TMDLs established for streams in the subbasin. Some TMDLs have been established for non-listed streams since water quality data show that there is an exceedance of Idaho's water quality standards. Table B provides a summary of the assessment outcomes for each of the 303(d) listed segments and the unlisted segments receiving a TMDL.

Beaver Creek

There are two 303(d) listed segments on Beaver Creek. The listed segments are from Spencer to Dubois and from Dubois to Camas Creek. Pollutants for both of the listed segments are flow alteration, habitat alteration, nutrients, sediment, and temperature. Stream temperature data collected in and above Spencer show that temperatures exceed Idaho's numeric standard. Because of this, a temperature TMDL was established for Beaver Creek from Modoc Creek to I-15 Exit 172. Exit 172 is the endpoint for the TMDL since perennial flows are seldom seen below this point.

Water quality data show that sediment and nutrients are not definitively the sources of beneficial use impairment in the listed segment of Beaver Creek. Beaver Creek from Exit 172 to Camas Creek (mouth) is naturally devoid of flow, so it is proposed to be de-listed and re-listed as flow altered.

Camas Creek

Camas Creek is 303(d) listed from headwaters (Spring Creek confluence) to mouth. The listed pollutants for the upper segment of Camas Creek are flow alteration, nutrients, and sediment. Part of this section, above T9N, R37E, Section 16 (N44.19270°, W-111.98284°), is perennial. The lower half of this segment is flow altered (irrigation) and natural infiltration into the basalt stream bed is extensive as well. Riparian grazing has contributed to bank erosion and elevated stream temperatures. Sediment and temperature TMDLs have been calculated to address the pollutants of concern above T9N, R37E, Section 16.

The lower section of Camas Creek is 303(d) listed for flow alteration, habitat alteration, sediment, nutrients, and temperature. This section of Camas Creek is intermittent and flow altered for irrigation, therefore this segment should be de-listed for sediment, nutrients, and temperature and re-listed as flow altered.

Cow Creek

Cow Creek is 303(d) listed for an unknown pollutant. Cow Creek is an ephemeral stream and therefore should be de-listed for unknown pollutants. Ephemeral streams are not expected to support the same biological communities as perennial waters.

Dairy Creek, East Fork Camas Creek, Modoc Creek, Threemile Creek, West Fork Camas Creek

Dairy, East Fork Camas, Modoc, Threemile, and West Fork Camas Creeks are all streams that are not 303(d) listed. However, stream temperature data, collected on all five streams, showed that there were major exceedances in Idaho's numeric temperature criteria. Temperature TMDLs were established for all five streams.

Land management and land use in all of the streams is homogeneous with riparian grazing impacting overall stream health and water quality.

Table B. Summary of assessment outcomes.

Water Body Segment [WQLS]	Assessment unit of 17040214	Pollutant	TMDL(s) Completed	Recommended Changes to §303(d) List	Justification
Beaver Creek* (Spencer to Dubois) **[2194]**	SK015_05	Flow	No	List below Exit 172 and de-list above Exit 172	Flow Altered (natural)
		Habitat	No	None	EPA Policy
		Nutrients	No	De-list	No Exceedances Documented
		Sediment	No	De-list	No Impacts Documented
		Temperature	Yes	None	Exceedances Documented
Beaver Creek* (Dubois to Camas Creek) **[2193]**	SK003_05 SK014_05	Flow	No	None	Flow Altered (natural and anthropogenic)
		Habitat	No	None	EPA Policy
		Nutrients	No	None	Flow Altered (natural and anthropogenic)
		Sediment	No	None	Flow Altered (natural and anthropogenic)
		Temperature	No	None	Flow Altered (natural and anthropogenic)
Beaver Creek (Headwaters to Spencer)	SK021_02 SK021_03 SK020_03 SK018_04 SK024_02	Temperature	Yes	None	Exceedances Documented
Camas Creek* (Spring Creek to Hwy 91) **[2191]**	SK002_05	Flow	No	List below T9N, R37E, Section 16 and de-list above	EPA Policy
		Habitat	No	None	EPA Policy
		Nutrients	No	De-list	No Exceedances Documented
		Sediment	Yes	None	Impacts Documented
		Temperature	Yes	None	Impacts Documented
Camas Creek* (Hwy 91 to Mud Lake) **[2190]**	SK001_06	Flow	No	None	Flow Altered (natural and anthropogenic)
		Nutrients	No	De-list	Flow Altered (natural and anthropogenic)
		Sediment	No	De-list	Flow Altered (natural and anthropogenic)
Cow Creek* (Headwaters to Thunder Gulch) **[5233]**	SK018_04	Unknown	No	De-list	Flow Altered (natural)
Dairy Creek (Headwaters to Mouth)	SK018_02	Temperature	Yes	None	Exceedances Documented
East Camas Creek (Headwaters to Mouth)	SK011_03 SK010_02 SK010_03	Temperature	Yes	None	Exceedances Documented
Modoc Creek (Headwaters to Mouth)	SK021_02	Temperature	Yes	None	Exceedances Documented
Threemile Creek (Headwaters to Mouth)	SK017_02 SK017_03	Temperature	Yes	None	Exceedances Documented
West Camas Creek (Headwaters to Mouth)	SK012_03 SK013_02 SK013_03	Temperature	Yes	None	Exceedances Documented

*1998 303(d) listed segment